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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,853	03/30/2004	Qinghua Li	884.C50US1	5604

21186 7590 05/12/2008
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EXAMINER	
MERED, HABTE	
ART UNIT	**PAPER NUMBER**
2616	
MAIL DATE	**DELIVERY MODE**
05/12/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/814,853	LI ET AL.	
	Examiner	Art Unit	
	HABTE MERED	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5, 7-17, and 19-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-17 and 19-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed on 1/4/2008 has been entered and fully considered.

2. Claims 1-5, 7-17, and 19-26 are pending. Claims 1, 8, 14, 19, and 22 are the base independent claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-14, 16-18, and 22-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shattil (US Pub. No. 2004/0086027) in view of Priotti (US Pub. No. 20040120410).

Regarding **claim1**, Shattil'027 discloses a method **(See Figures 4I, 4J, and 10B – Shattil'027 shows in Figure 4I a CI (Carrier Interferometry) method of receiving a combined plurality of signals in time domain and then converting back to frequency domain and performs filtering and then further performs frequency domain to time domain conversion and at last optionally performs an equalization/synchronization in time domain and Figures 4J and 10B are the receivers to implement the method shown in Figure 4I)**, including: converting a combined plurality P of asynchronous data streams received at substantially the same

time **(Shattil'027 shows in Figures 4l and 4j that the combined plurality of asynchronous data streams is represented by Rx and in paragraph 138 Shattil'027 discloses multiple antennas can exist giving multiple asynchronous data streams because the different transceivers transmitting to the receivers in Figures 4l and 4J are located at different distances from the receivers in Figures 4l and 4J causing the signals to arrive asynchronously. In fact Figure 10B shows multiple asynchronous data streams identical to Applicant's Figure 2. Further the Applicant in the specification in paragraph 2 has indicated SDMA system is technically asynchronous (i.e. specifically SDMA uplink communication using IEEE 802.11 compliant signals) and since Shattil'027 has shown his system supports SDMA in general as stated in paragraph 37 and effectively can be asynchronous as it does not preclude the IEEE 802.11 signals nor uplink communication. The underlying fact is that in Shattil'027's paragraph 37 it is unequivocally stated that the same wireless channel is shared by multiple users using the techniques of CDMA/TDMA/SDMA and the system is essentially asynchronous as signals coming from two different users that are located at different distances from the receiver arrive at different times at the receiver causing the signals to be asynchronous even though the wireless channel is simultaneously shared by the same users at the same time.**

In general, Shattil'027's system can accept synchronous or asynchronous signals but has the optional equalizers/synchronizers in the frequency and time domains to compensate any asynchronism. Further more Applicant clearly

indicates that there are different reasons for the receiver to receive asynchronous signals after traveling in the wireless channel and mentions only a few causes of asynchronism amongst many in paragraph 16 of the specification. One very well known reason for asynchronism is multipath interference.

Shattil'027 describes that signals arriving at its receivers are impacted by multipath fading that causes phase and time shift resulting in a plurality of asynchronous signals due to Inter-Symbol Interference and requires an equalizer/synchronizer in the frequency domain or time domain as detailed in paragraphs 134, 135 and 137. Last but not least that the architecture of Shattil'027's receivers is shown in Figure 12B and element 1291 of Figure 12B is designed to compensate for interference in the wireless channel caused by multipath, dispersion, co-channel/Inter-Symbol interferences as detailed in paragraph 202.) from a first time domain to a frequency domain **(In Figures 4J and 10B, the asynchronous signals Rx are directly fed to and FFT or DFT to convert each of the Rx asynchronous composite signals from time domain to frequency domain as further detailed in paragraphs 141 and 186)**;

separating, the combined plurality P of asynchronous data streams into a separated plurality of data streams in the frequency domain **(In Figure 4J and 10B 1...M composite asynchronous Rx signals are separated into N data streams in the frequency domain and for further illustration see paragraphs 141, 142, 186, and 187. Further it should be noted that Shattil'027 teaches a second time domain as the output of Figure 4J's 462 is M data streams in the time domain as the**

combiners and integrators serve as an IFFT as illustrated in paragraphs 142 and 193. Shattil'027 also shows equalization/synchronization can occur optionally in the time and frequency domains as shown in Figure 4I block 454 and in paragraph 42, 44, 89, 90, 94, and 167).

Shattil'027 expressly fails to teach synchronizing at least one of the separated pluralities of data streams in a second time domain, wherein at least one of the separated plurality of data streams is formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard *or* an Institute of Electrical and Electronics Engineers 802.16 standard.

However, the above mentioned claimed limitations are well known in the art as evidenced by Priotti'410. In particular, Priotti'410 discloses synchronizing at least one of the separated pluralities of data streams in a second time domain **(See Paragraph 43 and Figure 1, element 116. It should be noted here that neither a receiver or a transmitter is claimed and hence element 116 of Figure 1 can be considered a second time domain synchronization taking into consideration the first time domain conversion at the transmitter. Never the less, Priotti'410 clearly teaches synchronization in the second time domain in the receiver 106 of the wireless system of Figure 1. The first time synchronization occurs in element 116 of Figure 1. The second time synchronization occurs in the second time domain in Figure 1, element 130. Priotti'410 teaches in paragraph 52 discloses after the data stream is converted by FFT 118 into frequency domain then it is demodulated in**

module 130 converting it to the second time domain and doing time synchronization using module 116.

This is further evidenced by the disclosure in paragraph 59 indicating the data symbols 132 correspond to data symbols 101 as both data symbols are based on time domain. Applicant correctly indicates in paragraph 46 of the specification that synchronization in time domain is conventional and hence well known in the art and Priotti'410 concurs with Applicant as stated in paragraph 43. Priotti'410 shows in Figure 1 that the various user signals combined in time when received at the receiver is synchronized in time domain. Applicant indicates in paragraph 9 of the specification the need to do the well-known technique of synchronization in the time domain in a second time domain simply because separating asynchronous signals in time domain is a complex task without really explaining why or citing a prior art for support. However, the Applicant has not taught a new technique of synchronization apart from what is taught by Priotti'410 and which is known in the art and also multiplexing and demultiplexing different user signals in time domain is well known in the art and can be included in any time domain ranging from first to n);

wherein at least one of the separated plurality of data streams is formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard **(Priotti'410 in paragraphs 60 and 66 teaches unequivocally the separated data streams in the frequency domain are formatted according to IEEE 802.11 a**

standard by modules 126 and 128 of Figure 1) _or_ an Institute of Electrical and Electronics Engineers 802.16 standard.

In view of the above, having the method of Shattil'027 and then given the well established teaching of Priotti'410, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the method of Shattil'027 as taught by Priotti'410, since Priotti'410 clearly states in paragraph 8, Lines 1-5 that such a modification will allow post-FFT correction of fine frequency offset providing a much more accurate and enhanced synchronization at the receiver.

Regarding **claim 8**, Shattil discloses an article including a machine-accessible medium having associated information, wherein the information, when accessed, results in a machine performing **(See Figures 4I, 4J, and 10B – Shattil'027 shows in Figure 4I a CI (Carrier Interferometry) method of receiving a combined plurality of signals in time domain and then converting back to frequency domain and performs filtering and then further performs frequency domain to time domain conversion and at last optionally performs an equalization/synchronization in time domain and Figures 4J and 10B are the receivers to implement the method shown in Figure 4I)**:

converting a combined plurality P of asynchronous data streams received at substantially the same time **(Shattil'027 shows in Figures 4I and 4j that the combined plurality of asynchronous data streams is represented by Rx and in paragraph 138 Shattil'027 discloses multiple antennas can exist giving multiple asynchronous data streams because the different transceivers transmitting to the**

receivers in Figures 4I and 4J are located at different distances from the receivers in Figures 4I and 4J causing the signals to arrive asynchronously. In fact Figure 10B shows multiple asynchronous data streams identical to Applicant's Figure 2. Further the Applicant in the specification in paragraph 2 has indicated SDMA system is technically asynchronous (i.e. specifically SDMA uplink communication using IEEE 802.11 compliant signals) and since Shattil'027 has shown his system supports SDMA in general as stated in paragraph 37 and effectively can be asynchronous as it does not preclude the IEEE 802.11 signals nor uplink communication. The underlying fact is that in Shattil'027's paragraph 37 it is unequivocally stated that the same wireless channel is shared by multiple users using the techniques of CDMA/TDMA/SDMA and the system is essentially asynchronous as signals coming from two different users that are located at different distances from the receiver arrive at different times at the receiver causing the signals to be asynchronous even though the wireless channel is simultaneously shared by the same users at the same time. In general, Shattil'027's system can accept synchronous or asynchronous signals but has the optional equalizers/synchronizers in the frequency and time domains to compensate any asynchronism. Further more Applicant clearly indicates that there are different reasons for the receiver to receive asynchronous signals after traveling in the wireless channel and mentions only a few causes of asynchronism amongst many in paragraph 16 of the specification. One very well known reason for asynchronism is multipath interference. Shattil'027 describes

that signals arriving at its receivers are impacted by multipath fading that causes phase and time shift resulting in a plurality of asynchronous signals due to Inter-Symbol Interference and requires an equalizer/synchronizer in the frequency domain or time domain as detailed in paragraphs 134, 135 and 137. Last but not least that the architecture of Shattil'027's receivers is shown in Figure 12B and element 1291 of Figure 12B is designed to compensate for interference in the wireless channel caused by multipath, dispersion, co-channel/Inter-Symbol interferences as detailed in paragraph 202.) from a first time domain to a frequency domain **(In Figures 4J and 10B, the asynchronous signals Rx are directly fed to and FFT or DFT to convert each of the Rx asynchronous composite signals from time domain to frequency domain as further detailed in paragraphs 141 and 186)**; separating the combined plurality P of asynchronous data streams into a separated plurality of data streams in the frequency domain **(In Figure 4J and 10B 1...M composite asynchronous Rx signals are separated into N data streams in the frequency domain and for further illustration see paragraphs 141, 142, 186, and 187. Further it should be noted that Shattil'027 teaches a second time domain as the output of Figure 4J's 462 is M data streams in the time domain as the combiners and integrators serve as an IFFT as illustrated in paragraphs 142 and 193. Shattil'027 also shows equalization/synchronization can occur optionally in the time and frequency domains as shown in Figure 4I block 454 and in paragraph 42, 44, 89, 90, 94, and 167).**

Shattil'027 expressly fails to teach synchronizing at least one of the separated pluralities of data streams in a second time domain, wherein at least one of the separated plurality of data streams is formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard *or* an Institute of Electrical and Electronics Engineers 802.16 standard.

However, the above mentioned claimed limitations are well known in the art as evidenced by Priotti'410. In particular, Priotti'410 discloses synchronizing at least one of the separated pluralities of data streams in a second time domain **(See Paragraph 43 and Figure 1, element 116. It should be noted here that neither a receiver or a transmitter is claimed and hence element 116 of Figure 1 can be considered a second time domain synchronization taking into consideration the first time domain conversion at the transmitter. Never the less, Priotti'410 clearly teaches synchronization in the second time domain in the receiver 106 of the wireless system of Figure 1. The first time synchronization occurs in element 116 of Figure 1. The second time synchronization occurs in the second time domain in Figure 1, element 130. Priotti'410 teaches in paragraph 52 discloses after the data stream is converted by FFT 118 into frequency domain then it is demodulated in module 130 converting it to the second time domain and doing time synchronization using module 116. This is further evidenced by the disclosure in paragraph 59 indicating the data symbols 132 correspond to data symbols 101 as both data symbols are based on time domain. Applicant correctly indicates in paragraph 46 of the specification that synchronization in time domain is**

conventional and hence well known in the art and Priotti'410 concurs with Applicant as stated in paragraph 43. Priotti'410 shows in Figure 1 that the various user signals combined in time when received at the receiver is synchronized in time domain. Applicant indicates in paragraph 9 of the specification the need to do the well-known technique of synchronization in the time domain in a second time domain simply because separating asynchronous signals in time domain is a complex task without really explaining why or citing a prior art for support. However, the Applicant has not taught a new technique of synchronization apart from what is taught by Priotti'410 and which is known in the art and also multiplexing and demultiplexing different user signals in time domain is well known in the art and can be included in any time domain ranging from first to n) , wherein at least one of the separated plurality of data streams is formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard **(Priotti'410 in paragraphs 60 and 66 teaches unequivocally the separated data streams in the frequency domain are formatted according to IEEE 802.11 a standard by modules 126 and 128 of Figure 1)** *or* an Institute of Electrical and Electronics Engineers 802.16 standard.

In view of the above, having the article of Shattil'027 and then given the well established teaching of Priotti'410, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the article of Shattil'027

as taught by Priotti'410, since Priotti'410 clearly states in paragraph 8, Lines 1-5 that such a modification will allow post-FFT correction of fine frequency offset providing a much more accurate and enhanced synchronization at the receiver.

Regarding **claim 14**, Shattil discloses an apparatus **(See Figures 4I, 4J, and 10B – Shattil'027 shows in Figure 4I a CI (Carrier Interferometry) method of receiving a combined plurality of signals in time domain and then converting back to frequency domain and performs filtering and then further performs frequency domain to time domain conversion and at last optionally performs an equalization/synchronization in time domain and Figures 4J and 10B are the receivers to implement the method shown in Figure 4I)** including: a module to separate, in a frequency domain, a combined plurality P of asynchronous data streams received at substantially a same time **(Shattil'027 shows in Figures 4I and 4j that the combined plurality of asynchronous data streams is represented by Rx and in paragraph 138 Shattil'027 discloses multiple antennas can exist giving multiple asynchronous data streams because the different transceivers transmitting to the receivers in Figures 4I and 4J are located at different distances from the receivers in Figures 4I and 4J causing the signals to arrive asynchronously. In fact Figure 10B shows multiple asynchronous data streams identical to Applicant's Figure 2. Further the Applicant in the specification in paragraph 2 has indicated SDMA system is technically asynchronous (i.e. specifically SDMA uplink communication using IEEE 802.11 compliant signals) and since Shattil'027 has shown his system supports SDMA in general as stated in paragraph 37 and effectively can be**

asynchronous as it does not preclude the IEEE 802.11 signals nor uplink communication.

The underlying fact is that in Shattil'027's paragraph 37 it is unequivocally stated that the same wireless channel is shared by multiple users using the techniques of CDMA/TDMA/SDMA and the system is essentially asynchronous as signals coming from two different users that are located at different distances from the receiver arrive at different times at the receiver causing the signals to be asynchronous even though the wireless channel is simultaneously shared by the same users at the same time. In general, Shattil'027's system can accept synchronous or asynchronous signals but has the optional equalizers/synchronizers in the frequency and time domains to compensate any asynchronism. Further more Applicant clearly indicates that there are different reasons for the receiver to receive asynchronous signals after traveling in the wireless channel and mentions only a few causes of asynchronism amongst many in paragraph 16 of the specification.

One very well known reason for asynchronism is multipath interference. Shattil'027 describes that signals arriving at its receivers are impacted by multipath fading that causes phase and time shift resulting in a plurality of asynchronous signals due to Inter-Symbol Interference and requires an equalizer/synchronizer in the frequency domain or time domain as detailed in paragraphs 134, 135 and 137.

Last but not least that the architecture of Shattil'027's receivers is shown in Figure 12B and element 1291 of Figure 12B is designed to compensate for interference in the wireless channel caused by multipath, dispersion, co-channel/Inter-Symbol interferences as detailed in paragraph 202.) into a separated plurality of data streams **(In Figure 4J and 10B 1…M composite asynchronous Rx signals are separated into N data streams in the frequency domain and for further illustration see paragraphs 141, 142, 186, and 187. Further it should be noted that Shattil'027 teaches a second time domain as the output of Figure 4J's 462 is M data streams in the time domain as the combiners and integrators serve as an IFFT as illustrated in paragraphs 142 and 193.)**,

after the combined plurality P of asynchronous data streams have been converted from a first time domain to the frequency domain **(In Figures 4J and 10B, the asynchronous signals Rx are directly fed to and FFT or DFT to convert each of the Rx asynchronous composite signals from time domain to frequency domain as further detailed in paragraphs 141 and 186. Shattil'027 also shows equalization/synchronization can occur optionally in the time and frequency domains as shown in Figure 4I block 454 and in paragraph 42, 44, 89, 90, 94, and 167)**.

Shattil'027 expressly fails to disclose an apparatus with a synchronization module synchronizing at least one of the separated pluralities of data streams in a second time domain, wherein at least one of the separated plurality of data streams is

formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard *or* an Institute of Electrical and Electronics Engineers 802.16 standard.

However, the above mentioned claimed limitations are well known in the art as evidenced by Priotti'410. In particular, Priotti'410 discloses an apparatus with a synchronization module **(Figure 1, element 116)** synchronizing at least one of the separated pluralities of data streams in a second time domain **(See Paragraph 43 and Figure 1, element 116. It should be noted here that neither a receiver or a transmitter is claimed and hence element 116 of Figure 1 can be considered a second time domain synchronization taking into consideration the first time domain conversion at the transmitter. Never the less, Priotti'410 clearly teaches synchronization in the second time domain in the receiver 106 of the wireless system of Figure 1. The first time synchronization occurs in element 116 of Figure 1. The second time synchronization occurs in the second time domain in Figure 1, element 130. Priotti'410 teaches in paragraph 52 discloses after the data stream is converted by FFT 118 into frequency domain then it is demodulated in module 130 converting it to the second time domain and doing time synchronization using module 116. This is further evidenced by the disclosure in paragraph 59 indicating the data symbols 132 correspond to data symbols 101 as both data symbols are based on time domain.**

Applicant correctly indicates in paragraph 46 of the specification that synchronization in time domain is conventional and hence well known in the art and Priotti'410 concurs with Applicant as stated in paragraph 43. Priotti'410

shows in Figure 1 that the various user signals combined in time when received at the receiver is synchronized in time domain. Applicant indicates in paragraph 9 of the specification the need to do the well-known technique of synchronization in the time domain in a second time domain simply because separating asynchronous signals in time domain is a complex task without really explaining why or citing a prior art for support.

However, the Applicant has not taught a new technique of synchronization apart from what is taught by Priotti'410 and which is known in the art and also multiplexing and demultiplexing different user signals in time domain is well known in the art and can be included in any time domain ranging from first to n) , wherein at least one of the separated plurality of data streams is formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard **(Priotti'410 in paragraphs 60 and 66 teaches unequivocally the separated data streams in the frequency domain are formatted according to IEEE 802.11 a standard by modules 126 and 128 of Figure 1)** *or* an Institute of Electrical and Electronics Engineers 802.16 standard.

In view of the above, having the apparatus of Shattil'027 and then given the well established teaching of Priotti'410, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the apparatus of Shattil'027 as taught by Priotti'410, since Priotti'410 clearly states in paragraph 8, Lines 1-5 that such a modification will allow post-FFT correction of fine frequency offset providing a much more accurate and enhanced synchronization at the receiver.

Regarding **claim 22**, Shattil discloses a system **(Figures 4J and 10B)** including, a module to separate, in a frequency domain **(Figure 4J, element 472 and Figure 10B, elements 1071...1079)**, a combined plurality P of asynchronous data streams received at substantially a same time into a separated plurality of data streams **(M Rx composite asynchronous data streams are shown in the Figures. The reason why the signals are asynchronous is discussed in the rejection of claim 1 and applies to the rejection of claim 22),**

after the combined plurality P of asynchronous data streams have been converted from a first time domain to the frequency domain **(the M Rx signals received in a first time domain are fed to an FFT or DFT to be converted in the frequency domain)**; and a plurality Q of antennas to receive the combined plurality P of asynchronous data streams.**(See Figures 10b – you have M Rx signals and hence M antennas but definitely there will be situations when you have less than M RX signals coming into the M antennas)**

Shattil'027 expressly fails to disclose a system with a synchronization module synchronizing at least one of the separated pluralities of data streams in a second time domain, wherein at least one of the separated plurality of data streams is formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard *or* an Institute of Electrical and Electronics Engineers 802.16 standard.

However, the above mentioned claimed limitations are well known in the art as evidenced by Priotti'410. In particular, Priotti'410 discloses a system with a synchronization module **(Figure 1, element 116)** synchronizing at least one of the

separated pluralities of data streams in a second time domain **(See Paragraph 43 and Figure 1, element 116. It should be noted here that neither a receiver or a transmitter is claimed and hence element 116 of Figure 1 can be considered a second time domain synchronization taking into consideration the first time domain conversion at the transmitter. Never the less, Priotti'410 clearly teaches synchronization in the second time domain in the receiver 106 of the wireless system of Figure 1.**

The first time synchronization occurs in element 116 of Figure 1. The second time synchronization occurs in the second time domain in Figure 1, element 130. Priotti'410 teaches in paragraph 52 discloses after the data stream is converted by FFT 118 into frequency domain then it is demodulated in module 130 converting it to the second time domain and doing time synchronization using module 116. This is further evidenced by the disclosure in paragraph 59 indicating the data symbols 132 correspond to data symbols 101 as both data symbols are based on time domain.

Applicant correctly indicates in paragraph 46 of the specification that synchronization in time domain is conventional and hence well known in the art and Priotti'410 concurs with Applicant as stated in paragraph 43. Priotti'410 shows in Figure 1 that the various user signals combined in time when received at the receiver is synchronized in time domain. Applicant indicates in paragraph 9 of the specification the need to do the well-known technique of synchronization in the time domain in a second time domain simply because separating

asynchronous signals in time domain is a complex task without really explaining why or citing a prior art for support. However, the Applicant has not taught a new technique of synchronization apart from what is taught by Priotti'410 and which is known in the art and also multiplexing and demultiplexing different user signals in time domain is well known in the art and can be included in any time domain ranging from first to n),

wherein at least one of the separated plurality of data streams is formatted according to one of an Institute of Electrical and Electronics Engineers 802.11 standard **(Priotti'410 in paragraphs 60 and 66 teaches unequivocally the separated data streams in the frequency domain are formatted according to IEEE 802.11 a standard by modules 126 and 128 of Figure 1)** *or* an Institute of Electrical and Electronics Engineers 802.16 standard.

In view of the above, having the apparatus of Shattil'027 and then given the well established teaching of Priotti'410, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the apparatus of Shattil'027 as taught by Priotti'410, since Priotti'410 clearly states in paragraph 8, Lines 1-5 that such a modification will allow post-FFT correction of fine frequency offset providing a much more accurate and enhanced synchronization at the receiver.

Regarding **claim 2,** Shattil'027 discloses a method further including separating the combined plurality P of asynchronous data streams using a channel matrix. **(See Figure 5B CI channel code matrix as detailed in Paragraph 145)**

Regarding **claim 3**, Shattil'027 discloses a method, further including: receiving, at substantially the same time, the combined plurality P of asynchronous data streams at a plurality Q of antennas **(Shattil'027 shows in Figures 4I and 4j that the combined plurality of asynchronous data streams is represented by Rx and in paragraph 138 Shattil'027 discloses multiple antennas can exist giving multiple asynchronous data streams because the different transceivers transmitting to the receivers in Figures 4I and 4J are located at different distances from the receivers in Figures 4I and 4J causing the signals to arrive asynchronously. In fact Figure 10B shows multiple asynchronous data streams identical to Applicant's Figure 2. Further the Applicant in the specification in paragraph 2 has indicated SDMA system is technically asynchronous (i.e. specifically SDMA uplink communication using IEEE 802.11 compliant signals) and since Shattil'027 has shown his system supports SDMA in general as stated in paragraph 37 and effectively can be asynchronous as it does not preclude the IEEE 802.11 signals nor uplink communication.**

The underlying fact is that in Shattil'027's paragraph 37 it is unequivocally stated that the same wireless channel is shared by multiple users using the techniques of CDMA/TDMA/SDMA and the system is essentially asynchronous as signals coming from two different users that are located at different distances from the receiver arrive at different times at the receiver causing the signals to be asynchronous even though the wireless channel is simultaneously shared by the same users at the same time. In general, Shattil'027's system can accept

synchronous or asynchronous signals but has the optional equalizers/synchronizers in the frequency and time domains to compensate any asynchronism. Further more Applicant clearly indicates that there are different reasons for the receiver to receive asynchronous signals after traveling in the wireless channel and mentions only a few causes of asynchronism amongst many in paragraph 16 of the specification.

One very well known reason for asynchronism is multipath interference. Shattil'027 describes that signals arriving at its receivers are impacted by multipath fading that causes phase and time shift resulting in a plurality of asynchronous signals due to Inter-Symbol Interference and requires an equalizer/synchronizer in the frequency domain or time domain as detailed in paragraphs 134, 135 and 137. Last but not least that the architecture of Shattil'027's receivers is shown in Figure 12B and element 1291 of Figure 12B is designed to compensate for interference in the wireless channel caused by multipath, dispersion, co-channel/Inter-Symbol interferences as detailed in paragraph 202.) into a separated plurality of data streams **(In Figure 4J and 10B 1…M composite asynchronous Rx signals are separated into N data streams in the frequency domain and for further illustration see paragraphs 141, 142, 186, and 187. Further it should be noted that Shattil'027 teaches a second time domain as the output of Figure 4J's 462 is M data streams in the time domain as the combiners and integrators serve as an IFFT as illustrated in paragraphs 142 and 193.).**

Regarding **claim 4**, Shattil'027 discloses a method, further including: separating the combined plurality P of asynchronous data streams into the separated plurality of data streams in the frequency domain using a frequency spatial demapper. **(See Figure 10b and 4J, all the mapping done in the frequency domain is done by a frequency demapper by definition and is spatial because the different signals are separated in space and the same reasoning applies to the combiners shown in the Figures.)**

Regarding **claim 5**, Shattil'027 discloses a method, wherein the separated plurality of data streams corresponds directly to a number of wireless channels. **(See Figure 10 B – M Rx antennas and M data streams in the time domain corresponding to CBD 1 to CBD M where each antenna is a source of the wireless data stream)**.

Regarding **claim 7**, the combination of Shattil'027 and Priotti'410 discloses a method, further including: converting the separated plurality of data streams into the second time domain prior to the synchronizing **(It should be noted that Shattil'027 teaches a second time domain as the output of Figure 4J's 462 is M data streams in the time domain as the combiners and integrators serve as an IFFT as illustrated in paragraphs 142 and 193. Also in Shattil'027's Figure 11 the output of the IFFT is a second time domain and Priotti'410's Figure 1, elements 116 and 130)**

Regarding **claim 9**, Shattil'027 discloses a wireless access point performs the separating the data streams. **(See Figure 13B where base stations 1310 and 1310 serve as access points.)**.

Regarding **claim 10**, Shattil'027 discloses an article wherein the information, when accessed, results in the machine performing: computing a frequency response for a number of channels corresponding to the plurality P of asynchronous data streams. **(See Figures 4J, 10B, and 11 and see paragraphs 141, 142, 186, and 187. Shattil'027 shows conversion of the asynchronous signals being converted from time domain to frequency domain and spatially separating the signals in frequency domain and combining it.)**

Regarding **claim 11**, the Shattil'027 discloses an article wherein the information, when accessed, results in the machine performing: converting the separated plurality of data streams in the frequency domain into a separated plurality of data streams in the second time domain **(It should be noted that Shattil'027 teaches a second time domain as the output of Figure 4J's 462 is M data streams in the time domain as the combiners and integrators serve as an IFFT as illustrated in paragraphs 142 and 193. Also in Shattil'027's Figure 11 the output of the IFFT is a second time domain).**

Regarding **claim 12**, the combination of Shattil'027 and Priotti'410 discloses an article, wherein the information, when accessed, results in the machine performing: synchronizing at least one of the separated pluralities of data streams after detecting a presence of a short preamble. **(This is conventional synchronizing technique as**

admitted by Applicant in paragraph 46 of the specification and it is obvious that both Shattil'027 and Priotti'410 and specifically Priotti'410 does detect time and frequency offset based on the length of the training symbols like Applicant as suggested by Priotti'410 in paragraph 9 and Figure 2, 1st block)

Regarding **claim 13**, the combination of Shattil'027 and Priotti'410 discloses an article, wherein the information when accessed results in the machine performing estimating a coarse frequency set. **(See Priotti'410 – Paragraph 5)**

Regarding **claim 16**, Shattil'027 discloses an apparatus, wherein the module to separate further includes: a module to perform a fast Fourier transform on the combined plurality P of asynchronous data streams **(See Figure 4J element 472)**; and a module to perform an inverse fast Fourier transform on at least one of the separated plurality of data streams **(See Figure 11 elements 1106 and also please note that the combiners and integrators serve as an IFFT as in paragraphs 142 and 193.)**.

Regarding **claim 17**, the combination of Shattil'027 and Priotti'410 discloses an apparatus wherein the synchronization module is to receive at least one of the separated plurality of data streams after processing by a module capable of performing an inverse fast Fourier transform. **(See Priotti'410 Figure 1, elements 114 and 116 are the IFFT and synch unit respectively when taking Figure 1 as a single entity. Further only taking Figure 1, 106 as a single element based on Priotti'410' paragraph 52 indicates that Figure 1, element 130 will do time synchronization after the original data stream was converted into frequency domain. Since time synchronization of the type done by Figure 1, element 116 can only be done in**

time domain the element 130 of Figure 1 has to change the data stream back to time domain before performing time synchronization and hence element 130 has to have functionality of an IFFT.)

Regarding **claim 23**, Shattil'027 discloses a system wherein the plurality of Q antennas forms a portion of a multiple-input, multiple-output (MIMO) system. **(See Figures 6B and 11 and paragraphs 145 and 156)**

Regarding **claim 24**, Shattil'027 discloses a system further including a wireless access point coupled to the plurality Q of antennas. **(See Figures 10B and 13B)**

Regarding **claim 25**, the combination of Shattil'027 and Priotti'410 discloses a system wherein the wireless access point is to train at least one channel for at least some of a plurality of P users associated with the combined plurality P of asynchronous data streams. **(See Priotti'410 – Figure 1, elements 114 and 116 and further what the Applicant shows as training is done on the transmitter side and has nothing to do with the base claim which deals with a receiver and further training for the purpose of synchronizing transmitted signals as shown by Applicant is a must for SDMA systems which have almost synchronous signals multiplexed and requires constant calibrations and Shattil'027 system supports SDMA as illustrated in paragraphs 37 and 205.)**.

Regarding **claim 26**, Shattil'027 discloses a system, further including: a processor to form a Q x P channel matrix. **(See Figures 5B, 6B, and 11 and paragraph 156)**

4. **Claims 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over Shattil'027 in view of Priotti'410 as applied to claim 14 above, and further in view of Shattil'070 (US Pub. No. 20020150070).

Regarding **claim 15**, the combination of Shattil'027 and Priotti'410 fails to expressly disclose an apparatus where in the module to separate further includes: a spatial demultiplexed to provide the separated plurality of data streams.

However, the above mentioned claimed limitations are well known in the art as evidenced by Shattil'070. In particular, Shattil'070 discloses an apparatus wherein the module to separate further includes: a spatial demultiplexer **(Figure 2, element 206)** to provide the separated plurality of data streams **(Figure 2, element 206 and see also paragraphs 50 and 53 detailing how Figure 2, element 206 serves as a spatial demux)**.

In view of the above, having the apparatus based on the combination of Shattil'027 and Priotti'410 and then given the well established teaching of Shattil'070, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the apparatus based on the combination of Shattil'027 and Priotti'410 as taught by Shattil'070, since Shattil'070 clearly states in paragraph 50, that the use a spatial demultiplexer is to separate a particular signal from the interfering N-1 signals in the frequency domain.

5. **Claims 19-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shattil'027 in view of Shattil'070 and Schill et al (US Pub. No. 2003/0227985)

Regarding **claim 19**, Shattil'027 discloses an apparatus including: a module to perform a fast Fourier Transform on a combined plurality P of asynchronous **(The reason why the signals are asynchronous is discussed in the rejection of claim 1 and applies to the rejection of claim 19)** data streams **(See Figure 4J – element 472 and Figure 10B and element 1071)**;a module to perform an inverse fast Fourier transform to convert at least one of the separated plurality of data streams to a time domain **(It should be noted that Shattil teaches a second time domain as the output of Figure 4J's 462 is M data streams in the time domain as the combiners and integrators serve as an IFFT as illustrated in paragraphs 142 and 193. Also in Figure 11 the output of the IFFT is a second time domain)**.

Shattil'027 fails to expressly disclose a spatial demultiplexer to provide, in a frequency domain, a separate plurality of data streams associated with the combined plurality P of asynchronous data streams. (Shattil'027 effectively teaches a spatial demux but fails to refer to it as a spatial demux.)

However, the above mentioned claimed limitations are well known in the art as evidenced by Shattil'070. In particular, Shattil'070 discloses a spatial demultiplexer **(Figure 2, element 206)** to provide, in a frequency domain, a separate plurality of data streams associated with the combined plurality P of asynchronous data streams.(**Figure 2, element 206 and see also paragraphs 50 and 53 detailing how Figure 2, element 206 serves as a spatial demux)**.

In view of the above, having the apparatus based on the teachings of Shattil'027 and then given the well established teaching of Shattil'070, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the apparatus based on the teachings of Shattil'027 as taught by Shattil'070, since Shattil'070 clearly states in paragraph 50, that the use a spatial demultiplexer is to separate a particular signal from the interfering N-1 signals in the frequency domain.

Shattil'027 also fails to teach a module to synchronize at least one of the separated plurality of data streams in a time domain.

However, the above mentioned claimed limitations are well known in the art as evidenced by Schill'985. In particular, Schill'985 discloses a module to synchronize at least one of the separated plurality of data streams in a time domain **(See Figure 2 elements 13 and 21 are the synchronization module in the second time domain after the IFFT 10 in Figure 2).**

In view of the above, having the apparatus based on the teachings of Shattil'027 and then given the well established teaching of Schill'985, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the apparatus based on the teachings of Shattil'027 as taught by Schill'985, because it helps to prevent errors occurring in the received signals from lack of synchronization which can be rectified by preprocessing the signals in the receiver in the first time domain or post-processing the signals in the receiver in the second time domain.

Regarding **claim 20**, Shattil'027 discloses an apparatus wherein at least some of the separated pluralities of data streams include a plurality of OFDM symbols. **(See paragraphs 227 and 233)**

Regarding **claim 21**, the combination of Shattil'027, Shattil'070, and Schil'985 discloses an apparatus wherein the synchronization module is to receive at least one of the separated plurality of data streams after processing by a module capable of performing an inverse fast Fourier transform. **(Shattil'027 Figure 11 element's 1106 is an IFFT and Schill'985 Figure 2 element's 20 is IFFT and elements 13 and 21 constitute the synchronization module).**

Response to Arguments

1. The amendment filed on 1/4/2008 has been fully considered. Applicant's amendment to the specification is noted.

2. Applicant's arguments filed on 1/4/2008 have been fully considered but they are not persuasive.

3. Applicant argues with respect to claim 1, that the cited prior arts fail to teach or disclose the limitation reciting "converting a combined plurality P of Asynchronous data stream received at a substantially the same the same time from a first time domain to a frequency domain…". Applicant goes onto point Examiner's attempt to use Applicant's specification paragraph 2 to indicate that "SDMA system is technically asynchronous" is erroneous as the specification only cited a specific case of SDMA involving uplink

communication from IEEE 802.11 or IEEE 802.16 compliant SDMA systems. Applicant argues that Examiner's Shattil'027's citing from paragraph 37, 138 or Figures 4I, 4J, 10B fail to show "asynchronous data stream".

Examiner respectfully disagrees with Applicant positions. Shattil'027 system for the record does not particularly worry if the received signals are asynchronous or synchronous. Shattil'027's system assumes before signals are received incur some form of interference for signals and symbols to misalign and make the signals asynchronous and hence has the frequency equalizers (synchronizers) as well as the time equalizers (synchronizers). The synchronizers/Equalizers are shown in Figure 4I step 454 and in Figure 11 elements 1107.1 and 1108.1 does the co-channel interference cancellation in the second time domain which is a form of synchronization as detailed in Shattil'027's paragraph 193.

Shattil'027 further describes that signals arriving at its receivers are impacted by multipath fading that causes phase and time shift resulting in a plurality of asynchronous signals due to Inter-Symbol Interference and requires an equalizer/synchronizer in the frequency domain or time domain as detailed in paragraphs 134, 135 and 137. The architecture of Shattil'027's receivers is shown in Figure 12B and element 1291 of Figure 12B is designed to compensate for interference in the wireless channel caused by multipath, dispersion, co-channel/Inter-Symbol interferences as detailed in paragraph 202. So it is very clear from the Examiners point of view the signals arriving at the Shattil'027's receivers are assumed to be asynchronous.

Returning to Applicant's arguments, Examiner will show below that Applicant's position of none of the cited passage show "asynchronous data streams" is incorrect. Shattil'027 shows in Figures 4I and 4j that the combined plurality of asynchronous data streams is represented by Rx and in paragraph 138 Shattil'027 discloses multiple antennas can exist giving multiple asynchronous data streams because the different transceivers transmitting to the receivers in Figures 4I and 4J are located at different distances from the receivers in Figures 4I and 4J causing the signals to arrive asynchronously. In fact Figure 10B shows multiple asynchronous data streams identical to Applicant's Figure 2. Further the Applicant in the specification in paragraph 2 has indicated SDMA system is technically asynchronous (i.e. specifically SDMA uplink communication using IEEE 802.11 compliant signals) and since Shattil'027 has shown his system supports SDMA in general as stated in paragraph 37 and effectively can be asynchronous as it does not preclude the IEEE 802.11 signals nor uplink communication.

The underlying fact is that in Shattil'027's paragraph 37 it is unequivocally stated that the same wireless channel is shared by multiple users using the techniques of CDMA/TDMA/SDMA and the system is essentially asynchronous as signals coming from two different users that are located at different distances from the receiver arrive at different times at the receiver causing the signals to be asynchronous even though the wireless channel is simultaneously shared by the same users at the same time.

In general, Shattil'027's system can accept synchronous or asynchronous signals but has the optional equalizers/synchronizers in the frequency and time domains to compensate any asynchronism.

Finally it is the position of the Examiner, in retrospective, the primary reference even teaches equalization and synchronization in the time domain as shown in Figure 11 and is a very strong prior art and the secondary reference Priotti'410 really adds the IEEE 802.11 compliance as well as avoiding the asynchronism introduced in IEEE 802.11 compliant systems.

4. It should be noted that Applicant's amending all independent claims with the limitations of claims 6 and 18 has changed the scopes of the independent claims by using "or" instead of "and". Further Applicant has simply indicated that Shattil'027 fails to teach the limitations of cancelled claim 6 and 18. However, Examiner has pointed out in the previous Office Action the combination of Shattil'027 and Priotti'410 taught the limitations. Applicant has not indicated Priotti'410 does not teach the limitations. Examiner still cites Priotti'410 paragraphs 60 and 65 to teach these limitations. Hence the current Office Action is made final as it is necessitated by amendment and as there is no new prior arts introduced.

Conclusion

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HABTE MERED whose telephone number is (571)272-6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Aung S. Moe can be reached on 571 272 7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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4-22-08